

Some blood taken by cupping was examined in two instances. In both the quantity of water was increased, the quantity of salts was nearly normal, while the remaining constituents had decreased. The impoverished blood had been able to replace the water lost, while the organic constituents were still missing.

The author goes on to apply these chemical results, to explain the condition of the different organs and functions. The small anæmic pulse, the sunken eye, the small quantity of urine, the condition of the secretions generally, are all referred to in turn. But our readers will have heard or read most of these before. We have, therefore, only to add, that he appears inclined to regard diarrhœa as essentially a chemical process, manifested by the tendency to thickening of the mucous membrane, and exudation from it. To this we can only say, that on like grounds we must call all secretion, both healthy and morbid, a *chemical* process. This we must hesitate to do. Yet, until we can state why the healthy intestine secretes healthy intestinal mucus, we cannot tell why the diseased one should separate its diseased product, however different in appearance and quality the latter may be.—*Med. Times*, May 19, 1849.

6. *On the Source of Sugar in the Animal Economy.* By Dr. BERNARD.—Sugar is extensively distributed throughout the vegetable kingdom, but it exists also in animals. Vegetables do not find it ready made in the earth, but form it by some power of internal organization. Is it the same with animals? or is the sugar found in their bodies exclusively the product of their vegetable ingesta? This is the important question which it is our intention to submit to the test of experiment.

Sugar enters largely into the composition of the food of animals. The kinds of sugar are,—1st. Cane sugar, such as is found in the sugar-cane, beet-root, carrots, &c. 2d. Grape sugar, such as exists in grapes, and other saccharine fruits. Fecula should also be considered as saccharine matter, inasmuch as it is convertible into low sugar during the process of digestion. 3d. Sugar of milk, which is found in the milk of animals.

This is not the place to trace the distinctive characters of these forms of sugar, nor to determine the alternate changes which they undergo in order to become subservient to nutrition. I need only state, that as certain alimentary substances are known to furnish considerable quantities of sugar, we may consider them as the source of the saccharine matter which we discover in the blood, or other animal fluids. It is admitted that sugar is to be found in the healthy blood, after the ingestion of sugar, or matters convertible into sugar. But chemical facts teach us, on the one hand, that starch is the only principle which is convertible into sugar; and, on the other hand, in the belief that the animal economy has not the power to originate a principle, but only to transform those which are presented by the vegetable kingdom, it has been denied that the animal organism can form sugar, and the only power recognized is that of destroying and eliminating it. The facts which will be developed in the following essay, show us that such an opinion is not warranted by physiology.

FIRST SERIES OF EXPERIMENTS.—It has been observed, that during the digestion of saccharine or amylaceous matter, the blood contains sugar, and it has thence been concluded that the sugar is furnished by the aliments. The result of experiment taken alone is exact; but the experiment itself is incomplete, and the conclusions therefore false, as will be seen.

1st *Exp.* I injected thirty grains of starch, dissolved in a pint of water, into the stomach of a rabbit which had eaten oats and carrots. Five hours after, the animal was destroyed in the usual way, and thirty grains of blood from the heart collected. After coagulation, sugar was distinctly found in the serum. The stomach and intestines contained sugar, arising from the carrots and the transformation of the farina.

2d *Exp.* A strong dog was destroyed five hours after eating 300 grains of the jelly of starch. The serum of the blood taken from the heart contained a notable quantity of sugar. The contents of the stomach were acid, and contained no sugar; those of the intestines were alkaline and strongly saccharine.

3d *Exp.* A dog ate plentifully of sheep's head, and was killed after seven hours. In the serum of the blood sugar was distinctly found. No sugar was found in the intestinal canal.

4th *Exp.* A dog was killed after fasting two days. Sugar was unequivocally found in the serum.

The above experiments were repeated several times, and always with the same results. The general fact established is readily seen, viz., that sugar is constantly present in the blood of animals, whatever has been the nature of their food.

SECOND SERIES.—Whence is the sugar derived in the case of the animals fed on meat, and in that which had not eaten for two days previous to death? This is the question for the solution of which fresh experiments are required. It may be fairly presumed that the sugar was not formed in the heart, but had been transported thither from some other parts of the body. To determine more exactly the locality of its formation, I performed the following experiments.

1st *Exp.* A large, strong dog being killed, seven hours after a hearty meal of cooked meat and bones, digestion was found to be in full operation, and the gastro-intestinal circulation, and chyloferous ducts fully distended with their respective contents. I obtained, 1st, some blood from the junction of the splenic vein with the vena portæ; 2d, some chyle from the thoracic duct; 3d, blood as before from the cavities of the heart. I then carefully separated the contents of the stomach and bowels, and tested each separately for sugar with the subjoined results:—

1. The alimentary matters of the stomach and small intestines had an acid reaction, and afforded no evidence of the presence of sugar.

2. The milky serum afforded by the coagulation of the chyle was also destitute of sugar.

3. The blood of the vena portæ being allowed to coagulate, the serum was slightly opalescent and alkaline. I distinctly ascertained the presence of a large quantity of sugar.

4. The blood from the heart also presented sugar, but in less abundance.

The experiment was repeated several times, and with always the same result, but without my being able to comprehend how the portal blood should contain so large a quantity of sugar, while none existed in the small intestines. Reflecting, however, that this matter must be derived from some neighbouring viscus, I proceeded as follows:—

Having quickly destroyed a dog which had, some hours since, fed on matters destitute of sugar or fecula, I opened the abdominal cavity, and placed ligatures, 1st, on the branches of the mesenteric veins, close to the small intestines; 2d, on the splenic veins, close to the spleen; 3d, on the pancreatic vein; 4th, on the trunk of the vena portæ as it entered the liver. I then collected blood from each of these sources, and examined it. 1. Sugar was not found in the blood of the intestines, nor in their contents. [The original states that sugar *was* found, but this is evidently an error of the press, as appears from the context.—*Trans.*] 2. Sugar was not present in the blood, either of the splenic or pancreatic veins. 3. The blood of the portal veins contained a large quantity of sugar, as did also the tissue of the liver itself.

It was thus made evident that the liver was the source of the saccharine matter. But it must be asked, how is it that sugar is found in the portal veins; for supposing it to be formed in the hepatic glandules, it should be carried into the general circulation by the hepatic veins, and not flow back into the portal branches. This reflux is, in my opinion, easy to be understood; for, in fact, the circulation in the porta is mainly effected by the pressure of the abdominal parietes during life; if, therefore, the pressure be removed as in opening the abdomen, there would immediately be a reflux from the absence of valves in the portal system.

We have ascertained, by the above experiments, that sugar is found in the liver, and is carried into the general circulation by the blood of the hepatic veins, the reflux into the porta being accidental; but we regard this discovery to be so important, that we think it right to state the processes employed in the

investigation, in order that others may confirm, or confute, our conclusions, by following in our footsteps.

TESTS FOR SUGAR IN THE LIVER ITSELF.—A portion of liver is to be beaten in a mortar, and then boiled in a small quantity of water, and filtered. The filtered liquid possesses all the properties of a saccharine fluid. It becomes darker on boiling with liquor potassæ, and it reduces the double tartrate of potass and copper. If yeast be added at a certain temperature, fermentation ensues; if the fluid be distilled after fermentation, alcohol may be obtained.

The attempt was made to procure sugar in substance by operating on large quantities of liver, but although a fluid of syrupy consistence was obtained, crystallization did not take place.

The recognition of sugar in the blood is a very simple affair. The blood is allowed to coagulate, and the serum placed in a tube furnished with a stopper; to this is added a sixteenth in bulk of the tartrate of copper and potash, and boiled, when a quantity of the salt is reduced, proportionate to that of the sugar present. By this process the smallest traces of saccharine matter may be detected. Both in this test, as well as that by fermentation, it is necessary to operate on the serum while it is fresh, as sugar is rapidly decomposed spontaneously.

We have now traced the sugar of animals to the liver, but we have further to determine whence it is derived. Two suppositions may be entertained; either it results directly from a transformation of certain elements of the liver, or it is derived from the food. It may be said, in fact, that the animals which had been fed exclusively on animal food, or starved, might have eaten fecula or saccharine food the few days previously, and that the sugar thence derived had accumulated and been detained in the liver; and it might be added in support of this view, that the liver is known to retain arsenic and other poisons for a length of time. Without actually denying this view, the following experiments would seem to oppose it:—

1st *Exp.* A full-grown dog was starved for eight days, and then fed abundantly on cooked meat for eleven days; after this he was destroyed. The blood contained an abundance of sugar. This experiment was repeated several times; and certainly it would appear probable, that sugar, derived from food given antecedently, would have been eliminated after a lapse of nineteen days.

2d *Exp.* A rabbit, after a meal of carrots, was subjected to the division of the pneumo-gastric nerves. He was found dead seventeen hours after. *No sugar was found in the blood or liver.* This experiment was repeated with similar results. In both animals the bile, which is generally alkaline, was found to have a distinctly acid reaction.

This effect of division of the pneumo-gastric nerves is remarkable. As a further proof that sugar is found independently of food, I may state that I have found it in large quantity in foetal calves.

From the above facts the author draws the following conclusions:—

1. That diabetic sugar is a normal ingredient in the blood and liver of animals.

2. That the formation of sugar takes place in the liver, and independently of saccharine or feculent food.

3. That this formation of sugar commences before birth.

4. That it is allied to a state of integrity of the pneumo-gastric nerves.—*Prov. Med. and Surg. Journ.*, Feb. 7, from *Archives Générales de Méd.*

MATERIA MEDICA AND PHARMACY.

7. *On Sugar as an Antiphrodisiac.* By M. PROVENCAL.—Camphor has hitherto, by reason of its prompt effects, been considered as the best antiphrodisiac, and as the best antidote to cantharides. But sugar is a far more powerful and useful remedy, diminishing the venereal ardour, and repairing, in some degree as an aliment, the melancholy effects of over-indulgence. The dose is a